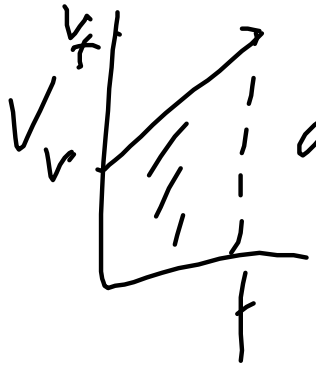
Acceleration Test Friday Nov 4

$a = \frac{\Delta v}{\Delta t}$ Slope of v-t graph

if a is constant

v-t graph is linear

$a = \frac{v_f - v_i}{t} \rightarrow \boxed{v_f = at + v_i}$



area $= \boxed{d = \frac{1}{2}(v_i + v_f)t}$

$\boxed{v_f^2 = v_i^2 + 2ad}$

$\boxed{d = v_i t + \frac{1}{2}at^2}$

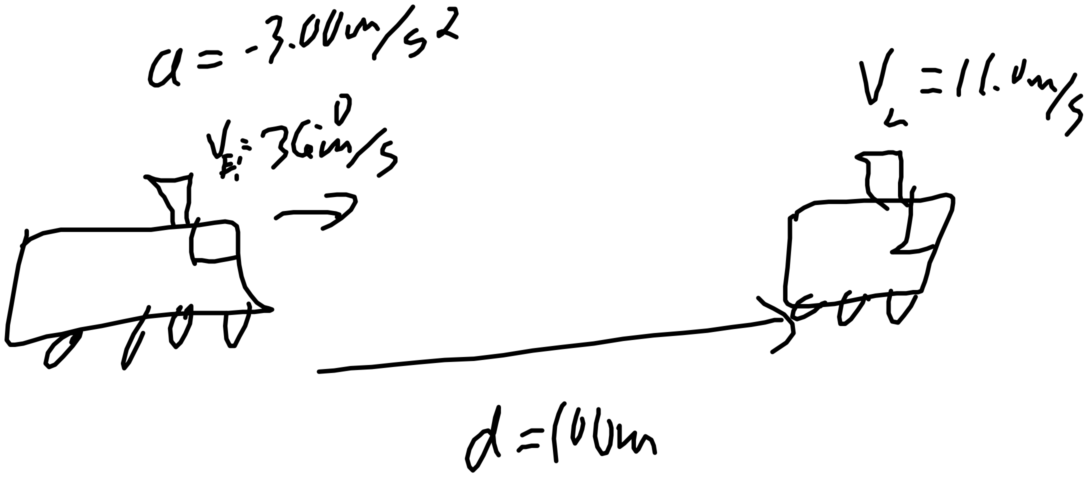
Solving Strategies

- givens - diagram
- equations
- Sub / manipulate

- Solve – sig figs
  – units

p 84

Q21



a) $t = 12 s$ d_E and d_L

V_{Ei} a

$d = v_i t + \frac{1}{2} a t^2$

$d_E = (36.0 m/s)(12 s) + \frac{1}{2}(-3.00 m/s^2)(12 s)^2$

$d_E = 432 m + (-216 m)$

$= \boxed{216 m}$

$d_L = V_L t = 11.0 m/s (12 s) = 132 m$

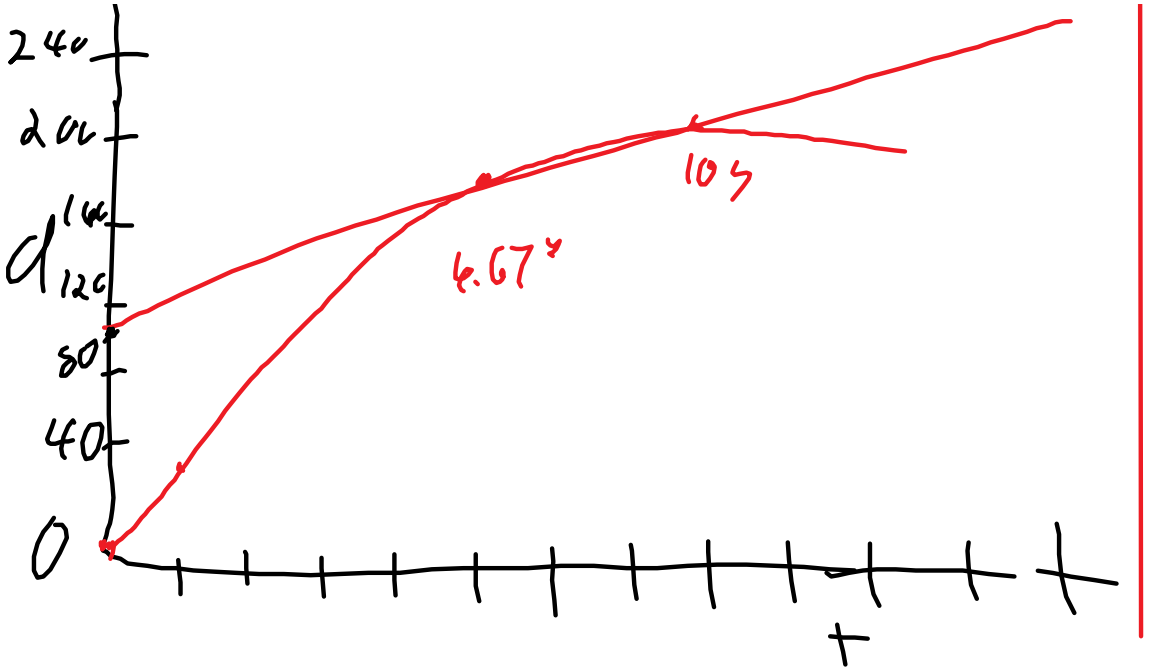
constant V

$132 m + 100 m = 232 m$

240 t

b)

b)



$d_L + 100 = d_E$

$11t + 100 = \frac{1}{2}(-3)t^2 + 36t$

$+1.5t^2 - 25t + 100 = 0$

$a x^2 + b x + c = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} = \frac{25 \pm \sqrt{25^2 - 4(1.5)(100)}}{2(1.5)}$

$625 - 600$

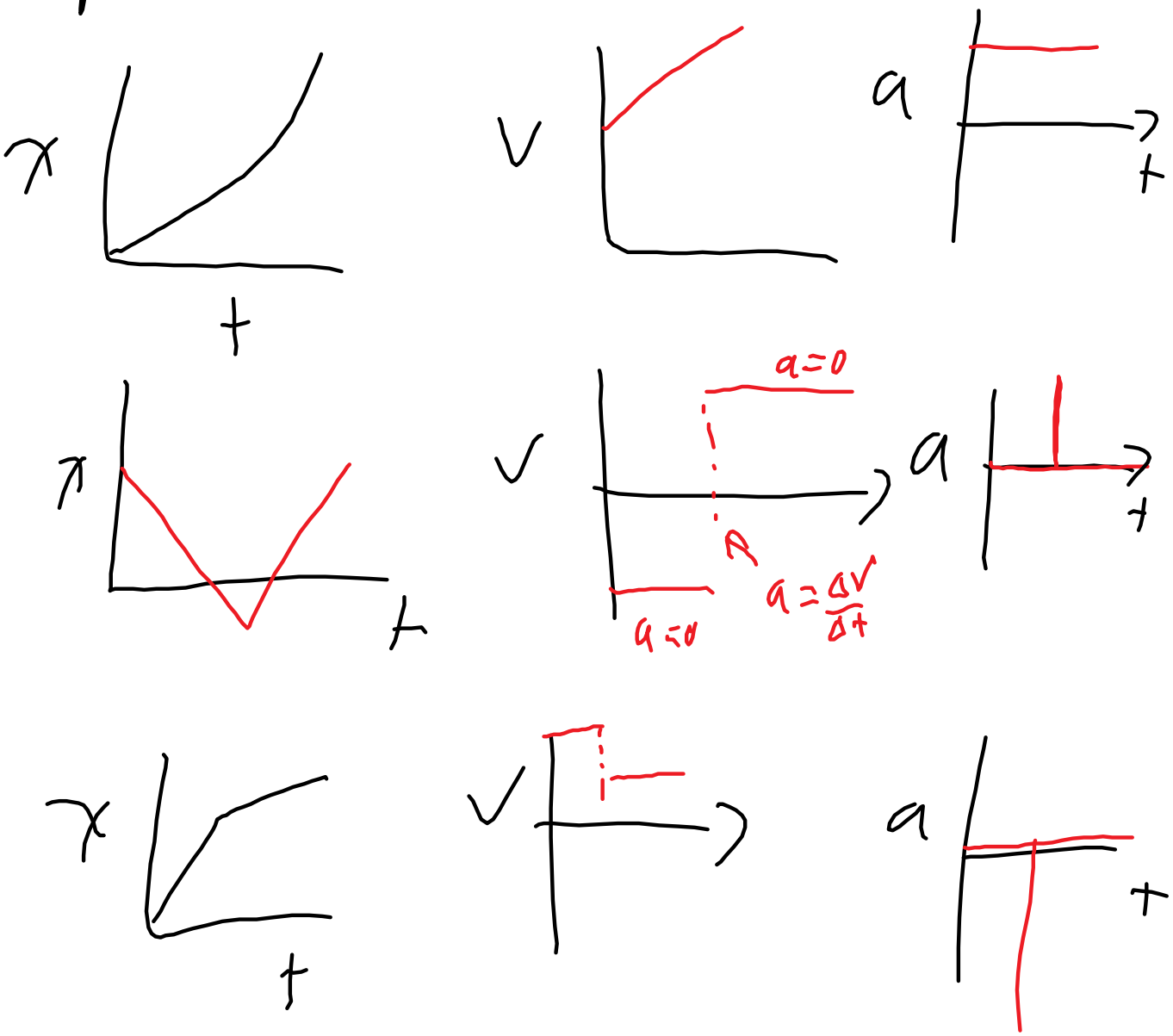
$\frac{25 \pm 5}{3}$

$t = 6.67\text{s}$ or 10s

p 84 - 85 problems 19, 21, 25, 28, 30-34, 37
review for the test

look at 82 Q4 and 85 q37

p 82 Prob 4



37 $v_1 = 0$

$v_4 = 0$

1.00 m = d_{4p}

$a = g = -9.80\ m/s^2$

$d_4 = 1.20$ m

a) $v_1 = ?$

V_3 V_3

+-0.0105

$V_f^2 = V_i^2 + 2ad$

$V_2^2 = 0^2 + 2(-9.8\,m/s^2)(-1.2\,s)$

$V_2 = \sqrt{23.52}$

$V_2 = 4.84974$

$V_2 = -4.85\,m/s$

going down

b) $V_3 = V_i \quad V_4 = V_f$

$V_f^2 = V_3^2 + 2ad$

$0 = V_3^2 + 2(-9.80\,m/s^2)(1.00\,m)$

$V_3 = \sqrt{19.6}$

$V_3 = 4.4272$

$V_3 = +4.43\,m/s$

$a) = \frac{V_3 - V_2}{t} = \frac{4.427 - (-4.85)}{0.0104}$

+

$a = +928\ m/s^2$

$930\ m/s^2$

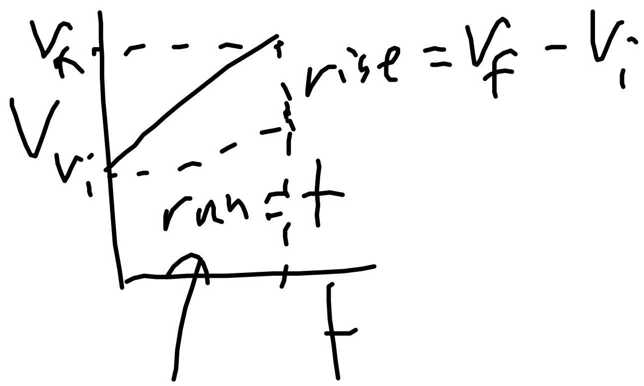
Test moved to Friday because of assembly

Acceleration review today

$a = \frac{\Delta v}{\Delta t}$ slope of v–t graph

if a is constant
v–t graph will be linear

$a = \frac{v_f - v_i}{t}$



$v_f = at + v_i$

$v_f = v_i + at$

area = $d_{triangle}$ + $d_{rectangle}$

$d = \frac{1}{2}(v_f - v_i)t + v_i t$

$d = \frac{1}{2}(v_f + v_i)t$

$d = v_i t + \frac{1}{2}at^2$

$v_f^2 = v_i^2 + 2ad$

Steps

- knowns, d, v_i, v_f, t, a - in a diagram
- equation
- sub/manipulate
- answer - sig figs
  - units
  - reasonable?

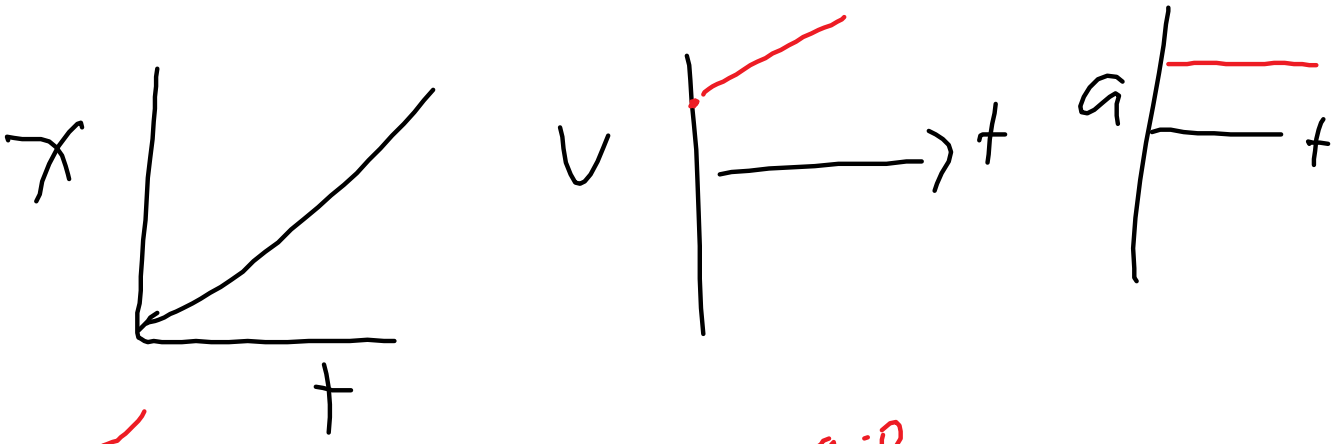
p 82 Q 3, 4, 7, 8,

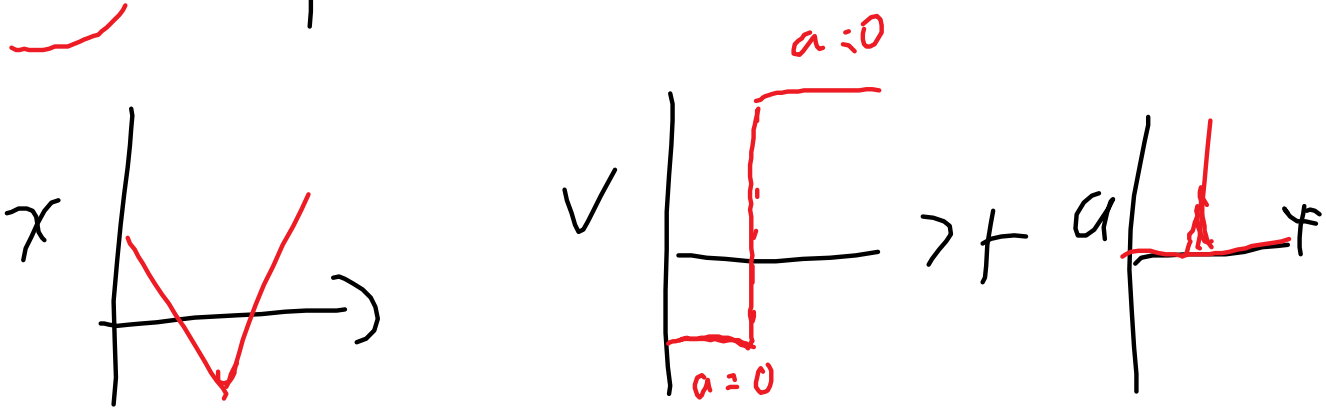
p 84-85 Q 11, 21, 25, 26, 30-34, 37

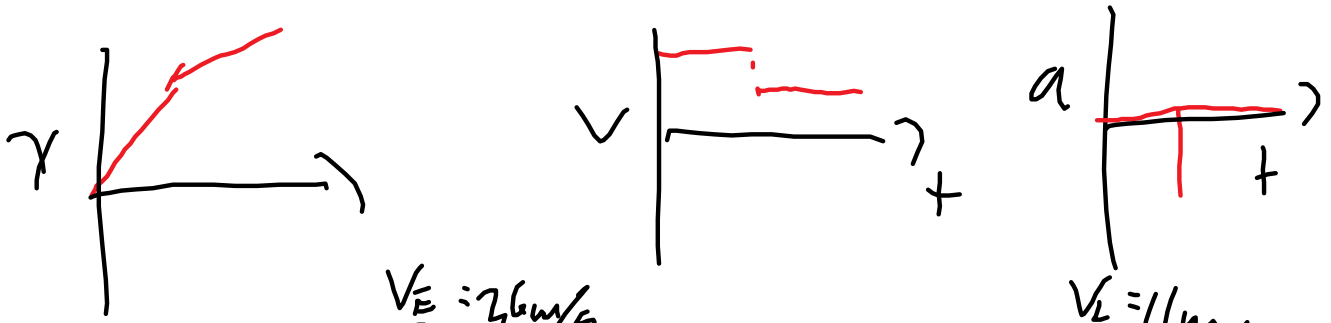
15 minutes

p82

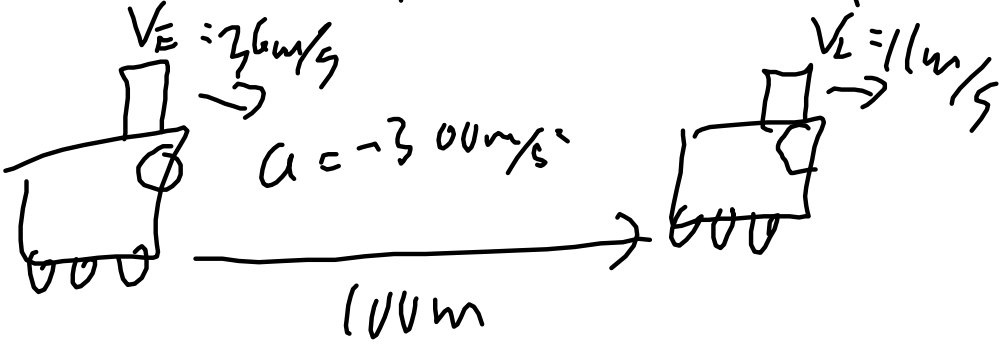
Problem 4







Q21



a) $t = \frac{\Delta v}{a} = \frac{0 - 36 m/s}{-3 m/s^2} = 12.0 s$

$d_E = ?$ $\quad d = \frac{1}{2} a t^2 + v_i t$

$$d_E = \frac{1}{2}(-3.00\,m/s^2)(12.0s)^2 + 36.0\,m/s(12.0s)$$

$$d_E = -216\,m + 432\,m$$

$$= \underline{216\,m}$$

$$d_L = 110\,m/s(12.0s) + \underline{100m}$$

$$= 132m + 100m = \underline{232m}$$

bigger.

b)

d_E	d_L	t
0	100	0
$36 - 1.5 = 34.5$	111	1
	122	2
	133	3
	144	4
	155	5
	⋮	6
		7
		8
		9
		10
		11
		12

$$d_E = d_L$$

$$\frac{1}{2}at^2 + v_1 t = v_L t + 100$$

$$-1.5t^2 + 36t = 11t + 100$$

$$ax^2 + bx + c = 0 \quad x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$-1.5t^2 + 25t - 100 = 0$$

$$1.5t^2 - 25t + 100 = 0$$

$$625 - 600$$

$$t = \frac{25 \pm \sqrt{25^2 - 4(1.5)(100)}}{2(1.5)}$$

$$t = \frac{25 \pm 5}{3} = \underline{6.67s}, \ 10.0s$$